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(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB, GB (European patent), GR (European patent), IT (European patent), LU (European patent), NL (European patent), NO, SE (European patent).

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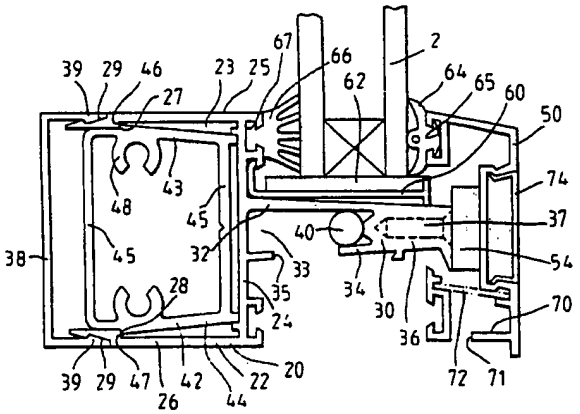
(54) Title: CURTAIN WALLING



(57) Abstract

In curtain walling comprising a framework of mullions (10) and transoms (20) supporting panels (2), each transom (20) is connected to each adjacent mullion (10) by means of a pin (40) fixed to the nose (14) of the mullion (10) and engaging in a recess (33) in the nose (30) of the transom (20), and a spigot (42) fixed to the body (12) of the mullion (10) and engaging in a recess (23) in the body (22) of the transom (20). The recess (33) in the nose (30) of the transom (20) is bounded by upper and lower walls (32, 34), the lower wall (34) having an opening (35) through which the pin (40) can move into the recess (33) during assembly. The recess (23) in the body (22) of the transom (20) is formed between rearwardly extending upper and lower flanges (25, 26). This enables the transom (20) to be moved into engagement with the connecting pin (40) and spigot (42) without any longitudinal movement of the transom (20) relative to the mullion (10), thus simplifying assembly of the mullions (10) and transoms (20). The rear ends of the flanges (25, 26) are formed as detents (27, 28) which engage steps (46, 42) in upper and lower faces (43, 44) of the spigot (42), so that the transom (20) snaps into position on the spigot (42). A locking cap (38) fits over the ends of the flanges (25, 26). The connecting pin (40) fits into a hole (18) in the nose (14) of the mullion and projects on both sides of the nose (14) to engage two adjacent transoms (20).

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CURTAIN WALLING

This invention relates to curtain walling.

The invention relates more particularly to curtain walling of the kind consisting of a framework of interconnected mullions and transoms supporting panels, which may for example be solid panels or glazed panels or windows. The mullions and transoms usually consist of lengths, for example of aluminium extrusion, each having a body portion and a nose portion projecting outwards from the body portion so as to support a panel positioned above the transom, the panel being held in place by a pressure plate releasably attached to the nose portion. Each transom is normally supported at each end by a spigot fixed to the adjacent mullion and projecting into the body portion of the transom. This conventional construction has the disadvantages that the weight of the panel acts through the nose portion, which is horizontally spaced from the spigots, so that the weight gives rise to a turning moment on the transom.

Published International patent application WO 87/06291 describes curtain walling in which the connection between a transom and an adjacent mullion consists of a shaped spigot on the nose portion of the mullion engaging in a shaped cavity in the nose portion of the transom. Engagement of the spigot in the nose portion of the transom enables the weight of the panel carried by the transom to be supported without any turning moment being exerted on the transom. However, a disadvantage of this system in some circumstances is that, in assembly of the curtain walling, the transom must be moved sideways, i.e. in the longitudinal direction of the transom, into engagement with the spigot on the

adjacent mullion, and the next mullion must then be moved sideways into engagement with the other end of the transom. It would be more convenient to be able to fix the mullions first, and then to move the transoms into place from the front, without any sideways movement.

According to one aspect of this invention there is provided curtain walling comprising a framework of mullions and transoms adapted to support panels, each transom consisting of a body portion and a nose portion extending from the body portion and positioned to receive the weight of the panel supported by the transom, and each mullion consisting of a body portion and a nose portion, each transom being connected to each adjacent mullion by means of a first connecting member fixed to the nose portion of the mullion and arranged to engage in a recess in the nose portion of the transom, and a second connecting member fixed to the body portion of the mullion and arranged to engage in a recess in the body portion of the transom, the recesses in the nose portion and body portion of the transom being open in a direction such that, during assembly, the transom can be moved into a position in which the connecting members engage in the recesses without longitudinal movement of the transom.

Preferably, locking means are provided for holding the transom against withdrawal from the engaged position.

In accordance with another aspect of the invention, the first connecting member comprises a pin fitting into a hole in the nose portion of the mullion and projecting on both sides of the nose portion.

In accordance with a further aspect of the invention, the body portion of the transom and the connecting member on the body portion of the mullion are provided with complementary locking means which move automatically into interlocking engagement as the transom is moved rearwardly into engagement with the connecting member. Preferably the body of the transom has upper and lower rearwardly extending flanges which engage upper and lower faces of the second connecting member which are inclined to one another so that the flanges are forced apart slightly as the transom is moved rearwardly, the rear ends of the flanges being formed as detents which move resiliently together to engage abutments in the upper and lower walls of the connecting member when the transom is fully engaged, to hold the transom against withdrawal.

Preferably, there is provided a locking cap which can be fitted over the ends of the flanges after the transom has been fully engaged, to prevent the flanges moving apart and thereby releasing the locking engagement with the connecting member.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a fragmentary isometric view of curtain walling in accordance with the invention,

Figure 2 is a cross-section through a transom of the curtain walling,

Figure 3 is a cross-section through a mullion of the curtain walling,

Figures 4, 5 and 6 are isometric views showing stages in the assembly of the curtain walling.and

Figure 7 is a cross-section through a transom of larger size.

Referring to the drawings, curtain walling comprises a network of mullions 10 and transoms 20, supporting panels 2. The panels 2 may be solid panels or glazed panels, such as the double glazed sealed units illustrated. The panels are held in place by pressure plates 50. The mullions 10 are adapted to be secured to the structural frame of a building in conventional manner.

Each mullion 10 has a body portion 12 generally in the shape of a rectangular box-section, and a nose portion 14 projecting forwards from the body portion. The nose portion 14 has two parallel outer faces 15, and is formed with a threaded groove 16 to receive screws connecting a pressure plate 50.

To connect the mullion 10 to transoms on either side, connecting members including a pin 40 and a pair of spigots 42 are fixed to the mullion at appropriate intervals. The pin 40 is a drive fit into a hole 18 drilled in the nose portion 14 of the mullion, and is of such a length that it projects a short distance either side of the nose portion, to enable it to engage the nose portion of a transom on either side of the mullion, as described below. As illustrated, the pin 40 is in the form of a hollow cylinder, split along its length to provide some resilience to hold the pin in place in the hole 18. Alternatively a solid pin could be used.

Each spigot 42 is in the form of a short box-section extrusion, having upper and lower walls 43 and 44 joined by front and rear walls 45. The upper wall 43 slopes upwards from its front edge to a rearwardly facing step 46 spaced from the rear edge of the wall. The

lower wall 44 slopes downwards from its front edge to a rearwardly facing step 47, so that the spigot tapers slightly from rear to front. The spigot 42 is fixed to the mullion by means of two self-tapping screws 49 which pass through screw guides 48 formed on the inner faces of the upper and lower walls 43 and 44 and engage the body portion 12 of the mullion.

Each transom 20 has a body portion 22 and a nose portion 30. The body portion 22 consists of a web 24 and two flanges 25 and 26 extending rearwards from upper and lower edges of the web 24 and defining between them a recess 23. The upper flange 25 is formed near its rear end with a forwardly facing step 27, which is arranged to engage the step 46 on the upper wall of the spigot 42. The lower flange 26 is similarly formed with the step 28 arranged to engage the step 47 on the lower wall of the spigot. The flanges 25 and 26 are parallel to one another, and the spigot 42 is shaped so that, as the transom is moved rearwards during assembly, the rear ends of the flanges engage the sloping walls 43 and 44 and are moved apart slightly until the steps 27 and 28 on the flanges snap into engagement behind the steps 46 and 47 on the spigot, to hold the transom against withdrawal. A length of extrusion 38 forms a clip which can be snapped over the rear ends of flanges 25 and 26, to prevent the flanges from being moved apart out of engagement with the spigot, teeth 39 on the clip 38 engaging in grooves 29 in the flanges. The outer edges of the clip 38 and flanges 25 and 26 are bevelled to ease movement of the clip into place.

The nose portion 30 of the transom 20 comprises an upper wall 32 and a lower wall 34 extending forwards from the web 24 to an outer

portion 36. The walls 32 and 34 enclose a recess 33 which can receive the connecting pin 40, and the lower wall 32 has an opening 35, extending the length of the transom, to enable the pin 40 to enter the recess 33. The walls 32 and 34 are inclined, so that the nose portion 20 tapers from the rear to the front, the upper wall 32 defining a sloping platform from which water can drain. The outer portion 36 of the nose is formed with a threaded groove 37 to receive screws connecting a pressure plate 50.

The connection of the transom 20 to the adjacent mullion 10 through the pin 40 and spigot 42 allows the transom to be moved into position from the front, the flanges 25 and 26 being moved over the spigot, and the transom manoeuvered so that the pin 40 moves through the opening 35 into the recess 33 in the nose portion. The transom is then moved until the flanges snap into engagement over the spigot, and the locking clip 38 can be snapped onto the flanges. It will be appreciated that connection of the transom requires no movement of the transom sideways, i.e. in the longitudinal direction of the transom. The pin 40 provides support for the nose portion of the transom, so that the weight of the panel 2 supported by the transom is transmitted directly to the mullion without any turning moment on the transom.

A pressure plate 50 is fixed to the nose portion of each transom 20 by means of screws 52 which pass through holes in the pressure plate and screw into the threaded groove 37 in the outer portion 36 of the nose. The pressure plate 50 is spaced from the nose portion 30 by insulating bushes 54, to allow air to circulate between the pressure plate and the

nose portion, and to act as a thermal break. Pressure plates 50 are similarly fixed to the mullions 10.

The panels 2 are clamped between the pressure plates 50 and the body portions 12 and 22 of the mullions 10 and transoms 20. Each panel is supported along its lower edge by a number of carriers 60, spaced along the transom 20. Each carrier 60 is shaped to lie against the sloping upper wall 32 of the nose portion 30 to provide a horizontal surface on which the panel can rest. When the panel is a glazed unit, a setting block 62 of suitable material can be interposed between the panel and the carrier 60. An outer sealing gasket 64 is interposed between the panel 2 and the pressure plates 50 engaging the panel, the gasket being held in channels 65 formed in the pressure plate. An inner sealing gasket 66 is interposed between the panel 2 and the body portions 12 and 22 of the mullions and transoms engaged by the panel. The gasket 65 is held in channels 67 in the body portions 22 of the transoms 20 and channels 68 in the body portions 12 of the mullions 10. The thickness of the gaskets 66 may be chosen to suit the thickness of panel 2, so that for a thinner panel a thicker gasket would be used. The gaskets 66 may be prefabricated rectangular gaskets as described in application WO 87/06291.

The mullions, transoms and pressure plates are arranged so that the cavity between the pressure plate, the transom and the panels on either side of the nose portion of the transom is fully ventilated, allowing a free circulation of air to inhibit the build up of moisture in the cavity, and to allow any moisture which penetrates into the cavity to

drain from the cavity, in a similar manner to the system described in application WO 87/06291. Thus, the lower peripheral portion of the pressure plate 50 is shaped to form a channel 70 which can receive water draining from the nose portion 30, and which is provided with drainage slots 71 to allow the water to escape. A baffle plate 72 may be provided to cover the top of the channel 70, to prevent rain water from being blown into the cavity. A decorative insert 74 may be provided in the pressure plate 50.

Where it is necessary to join two mullions together vertically, a spigot 80 (Figure 3) is employed, fitting into the bodies 12 of the two mullions. The spigot is located between pairs of flanges 82 and 83 on the inner faces of the side walls of the mullion. The front pair of flanges 82 is spaced rearwardly from the front wall 13 of the mullion, defining a cavity 84 between the spigot 80 and the front wall of the mullion which can receive a sealant. This enables the joint between the two mullions to be easily and effectively sealed, for example by injecting suitable mastic into the cavity. If the front to rear dimension of the mullion is relatively small, the spigot can fit against the rear wall of the mullion, without the need for the rear pair of flanges 83.

Figure 7 shows an alternative embodiment in which a transom of larger front-to-rear dimension is employed. The transom 120 is supported by a pin 140 and spigot 142 as in the previously described embodiment. The spigot 142 is made with a larger front-to-rear dimension to match that of the transom, and may be provided with screw

guides 148 to allow the spigot to be attached by four screws to the body of the adjacent mullion. Figure 7 also illustrates a novel method of supporting on the transom a panel 200 backed with a layer of insulation, such as insulating foam 202. An inner sealing gasket 166 having a relatively large front-to-rear dimension is employed between the body 122 of the transom and the panel 200, the gasket being retained in a channel 167 in the transom. The gasket 166 is provided with a longitudinally extending slot 168 which receives the downwardly extending leg 172 of an extrusion 170. The extrusion 170 has a horizontal portion 171 on which the insulating layer 202 is supported, and a rear leg 173 which rests on the body portion of the transom 120. This enables insulated panels of any width to be supported, by choosing an extrusion 170 of appropriate dimensions.

As shown in Figures 4, 5 and 6, in assembling the curtain walling, the mullions 10 are fixed in position and pins 40 and spigots 42 attached to the mullions at appropriate intervals (Figure 4). Transoms 20 are cut to the appropriate length, and the body portion 22 at each end of each transom 20 is cut away so that it can abut the body portion 12 of the adjacent mullion 10 whilst the nose portion 30 of the transom 20 abuts the nose portion 14 of the mullion 10, as shown in Figure 5. The nose portion 30 of the transom 20 is cut away as shown at 56 in Figure 5 to allow a pressure plate 50 to be fitted to the mullion. Each transom 20 is then moved into engagement with the pins 40 and spigots 42 on the mullions 10 at each of the transom 20, as described above, and clip 38 is snapped into position. Inner gaskets 66 are then attached to the mullions and transoms, and carriers 60, with mounting blocks 62

where appropriate are positioned on the nose portion 30 of the transom 20. Panels 2 are then moved into position, and pressure plates 50, to which the outer gaskets 64 have been attached, are moved into position and secured with screws 49.

The described system enables curtain walling to be installed easily and quickly, using a relatively small number of different components.

CLAIMS

1. Curtain walling comprising a framework of mullions (10) and transoms (20) adapted to support panels (2), each transom (20) consisting of a body portion (22) and a nose portion (30) extending from the body portion (22) and positioned to receive the weight of the panel (2) supported by the transom (20), and each mullion (10) consisting of a body portion (12) and a nose portion (14), each transom (20) being connected to each adjacent mullion (10) by means of a first connecting member (40) fixed to the nose portion (14) of the mullion (10) and arranged to engage in a recess (33) in the nose portion (30) of the transom (20), and a second connecting member (42) fixed to the body portion (12) of the mullion (10)and arranged to engage in a recess (23) in the body portion (22) of the transom, the recesses (33,23) in the nose portion (30) and body portion (22) of the transom (20) being open in a direction such that, during assembly, the transom (20) can be moved into a position in which the connecting members (40,42) engage in the recesses (33,23) without longitudinal movement of the transom (20).

2. Curtain walling as claimed in Claim 1, in which locking means (27,28; 46,47) are provided for holding the transom (20) against withdrawal from the engaged position.

3. Curtain walling as claimed in Claim 1 or Claim 2, in which the first connecting member comprises a pin (40) fitting into a hole (18) in the nose portion (14) of the mullion (10) and projecting on both sides of the nose portion (14).

4. Curtain walling as claimed in Claim 3, in which the pin (40) is a drive fit in the hole (18) in the nose portion (14).

5. Curtain walling as claimed in any preceding claim, in which the body portion (22) of the transom (20) and the connecting member (42) fixed to the body portion (12) of the mullion (10) are provided with complementary locking means (27,28; 46,47) which move automatically into interlocking engagement as the transom (20) is moved rearwardly into engagement with the connecting member (42).

6. Curtain walling as claimed in Claim 5, in which the body (22) of the transom (20) has upper and lower rearwardly extending flanges (25,26) which engage upper and lower walls (43,44) of the second connecting member (42) which are inclined to one another so that the flanges (25,26) are forced apart slightly as the transom (20) is moved rearwardly, the rear ends of the flanges (25,26) being formed as detents (27,28) which move resiliently together to engage abutment (46,47) in the upper and lower walls (43,44) of the connecting member (42) when the transom (20) is fully engaged, to hold the transom (20) against withdrawal.

7. Curtain walling as claimed in Claim 6, in which there is provided a locking cap (38) which can be fitted over the ends of the flanges (25,26) after the transom (20) has been fully engaged, to prevent the flanges (25,26) moving apart and thereby releasing the locking engagement with the second connecting member (42).

8. Curtain walling as claimed in Claim 7, in which the locking cap (38) has teeth (39) which engage in grooves (29) in the upper and lower faces respectively of the upper and lower flanges (25,26).

9. Curtain walling as claimed in any preceding claim, in which the nose portion (30) of the transom (20) has an upper wall (32) and a lower wall (34) bounding the recess (33) in the nose portion (30), the lower wall (34) being formed with an opening (35) through which the first connecting member (40) is moved into the recess (33) during assembly.

Fig.1

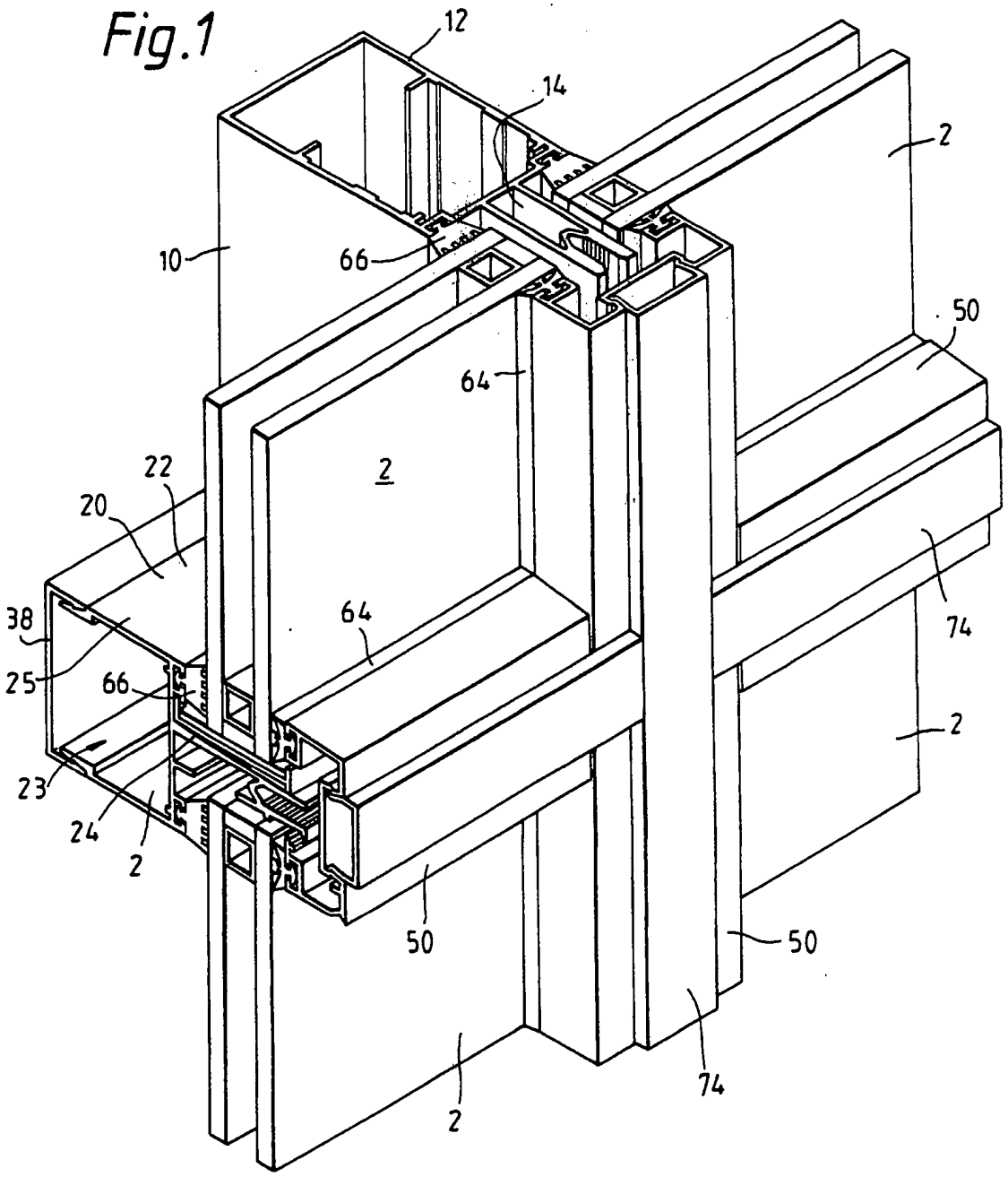

Fig.2

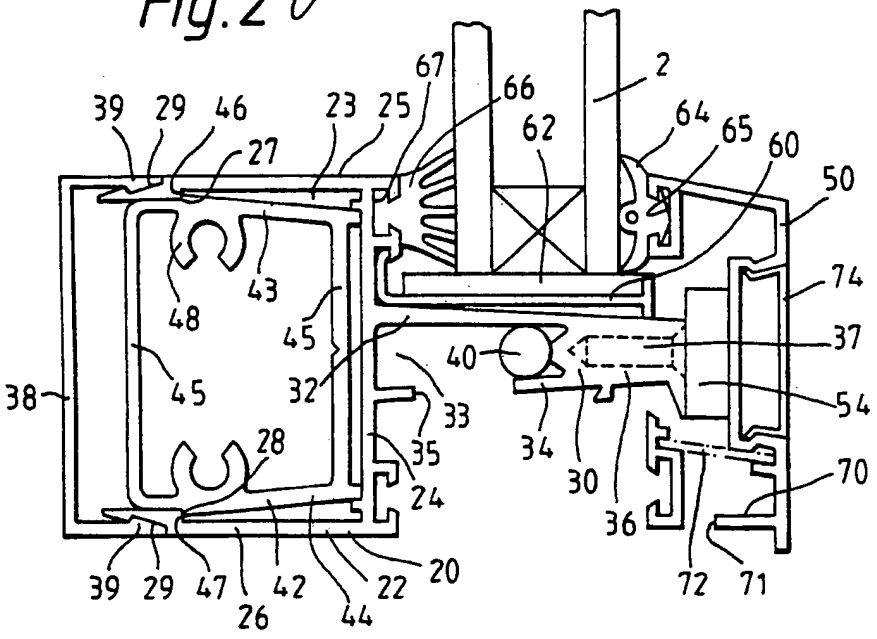

Fig.3

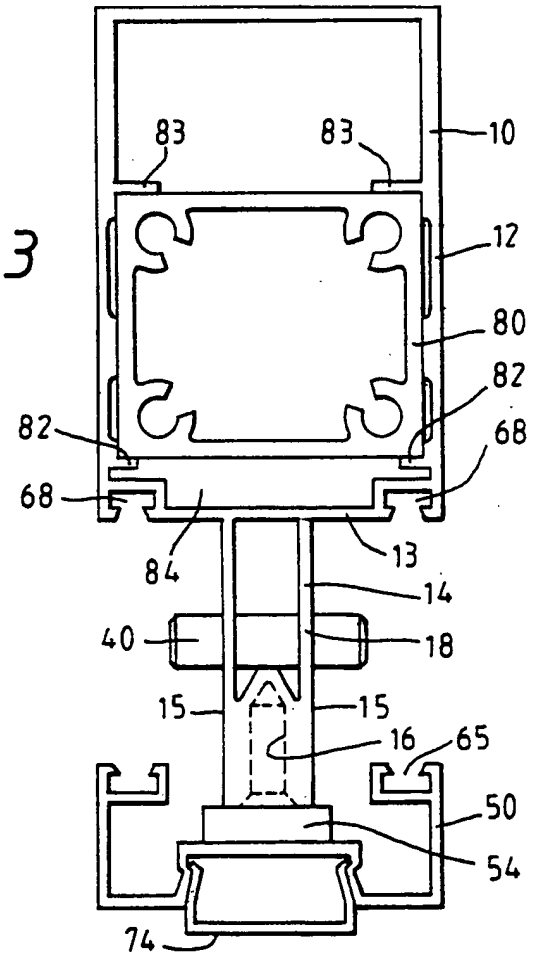

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Fig. 4

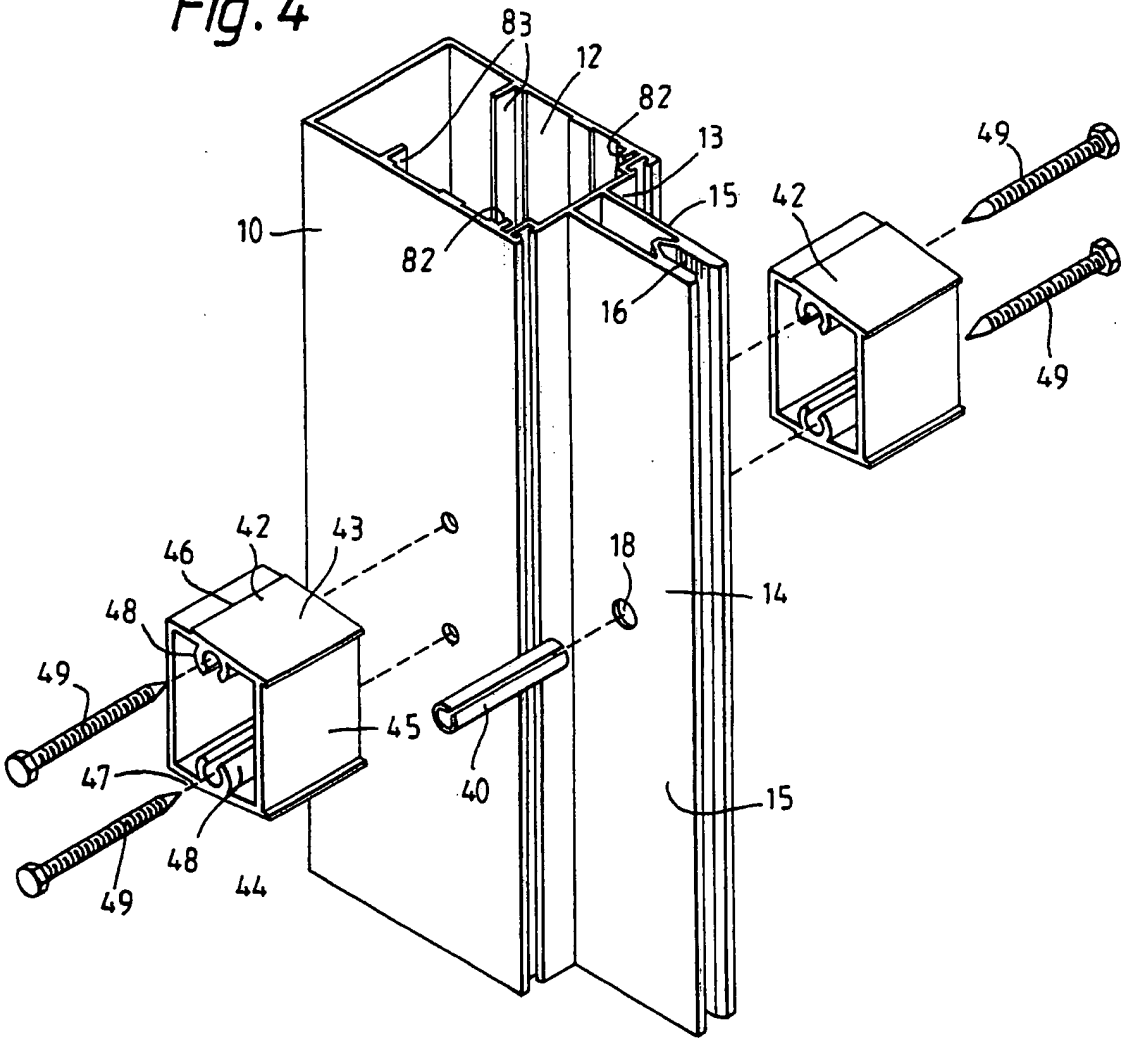

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Fig. 5

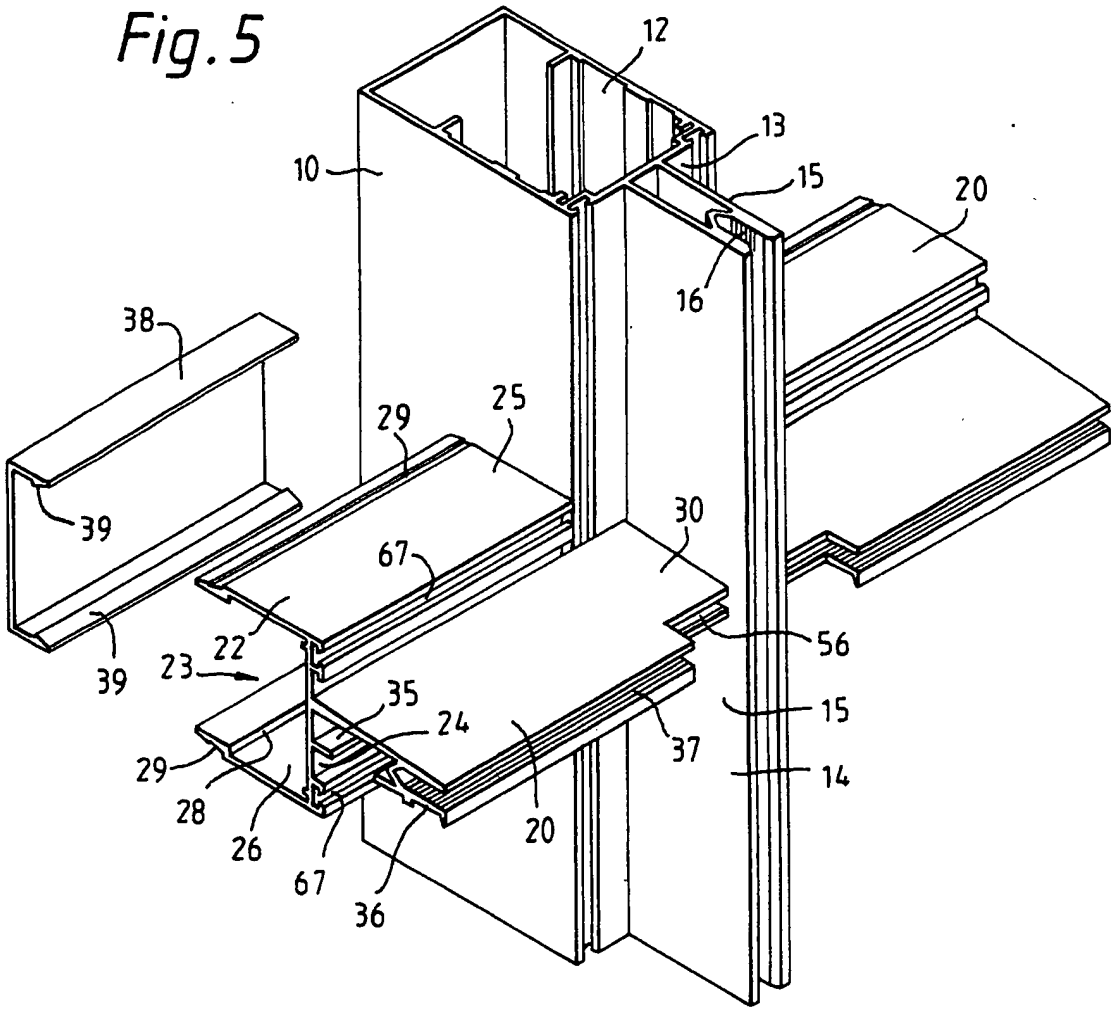
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Fig. 6

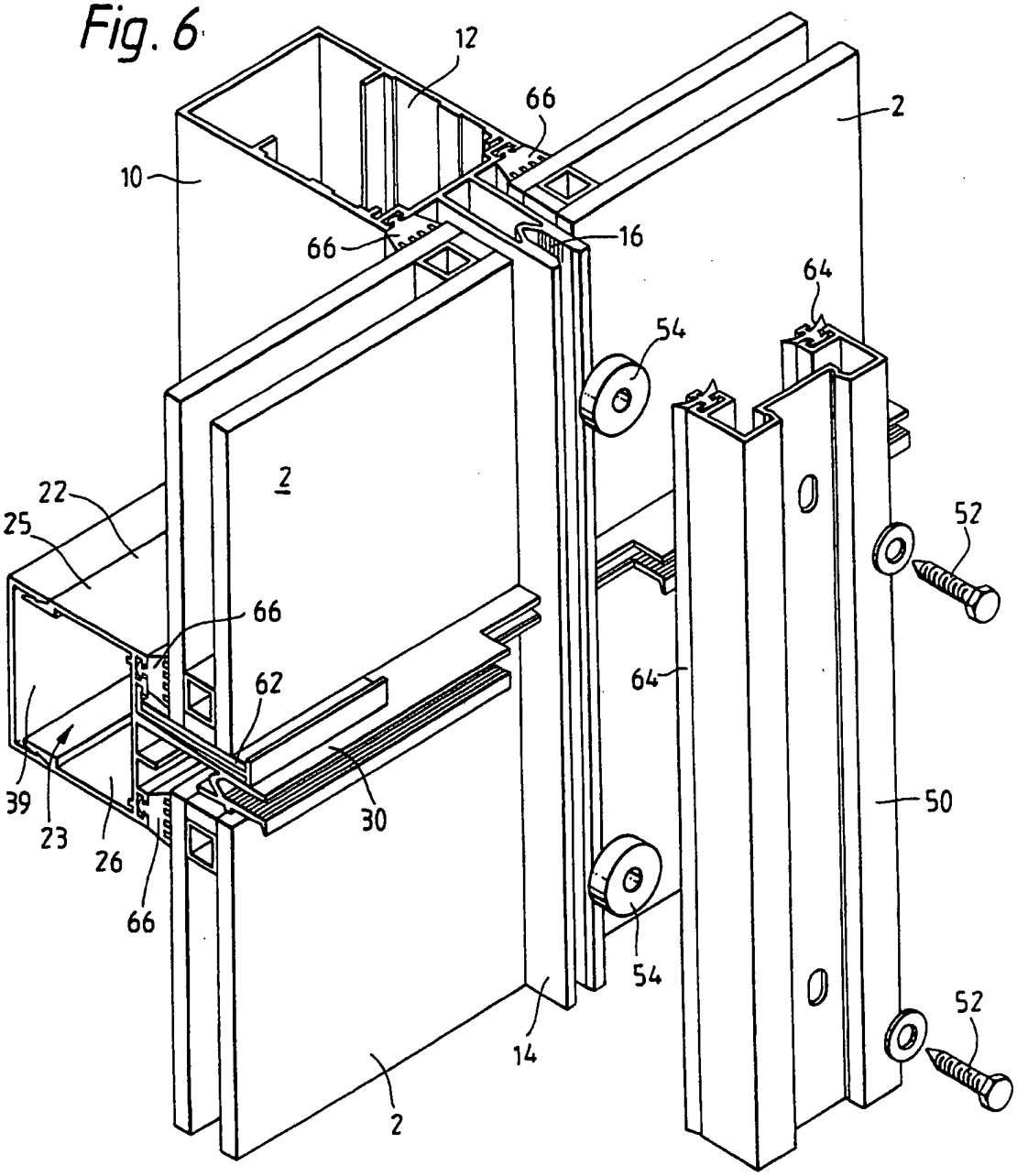

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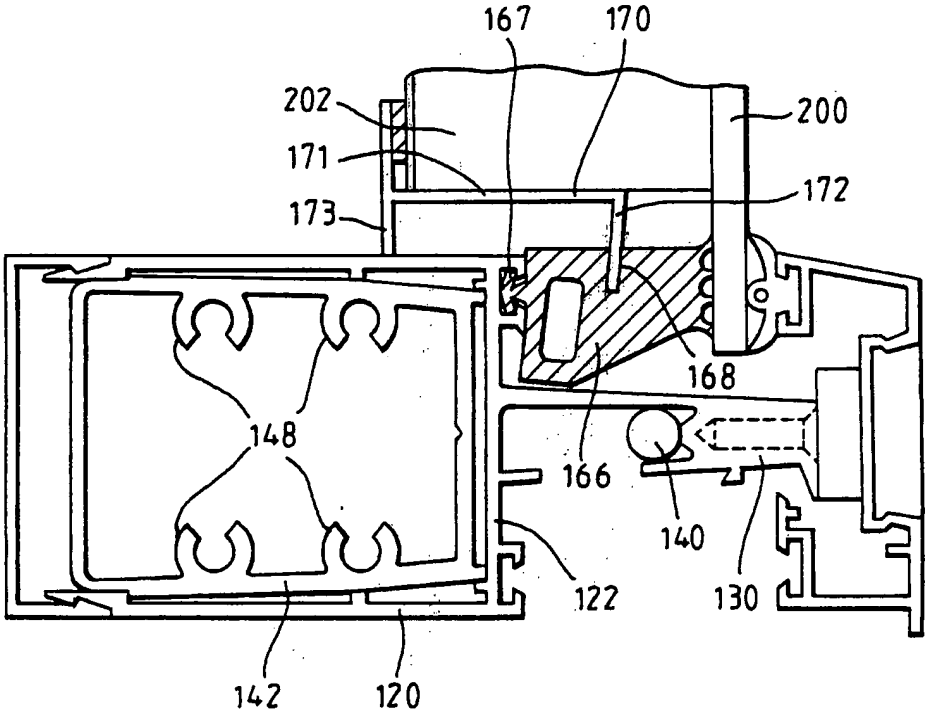
Fig. 7



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 91/00171

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 E04B2/96

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	E04B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
X Y	EP,A,221 480 (ELTREVA AG) May 13, 1987 see column 4, line 7 - column 5, line 30; figures 1,2	1-3 4
Y	DE,A,3 419 104 (MÜHLE) November 28, 1985 see page 8, line 8 - line 15; figures 1,2	4
A	US,A,3 798 862 (STOAKES) March 26, 1974 see column 3, line 3 - line 65; figures 1-3	1,2,5-8
A	WO,A,8 706 291 (CONSTRUCTION UTILITIES GROUP LTD) October 22, 1987 cited in the application	

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
08 MAY 1991	30. 05. 91
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	PORWOLL H.P.

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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. GB 9100171

SA 44587

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-221480	13-05-87	DE-A- 3539002	21-05-87
		JP-A- 62182333	10-08-87
		US-A- 4704831	10-11-87
DE-A-3419104	28-11-85	None	
US-A-3798862	26-03-74	None	
WO-A-8706291	22-10-87	EP-A,B 0266387	11-05-88

EPO FORM P0479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82